

***Natural Gas Markets:  
Direct and Indirect Factors  
Impacting Price and Availability***

Presented at SDPSC Energy Conference

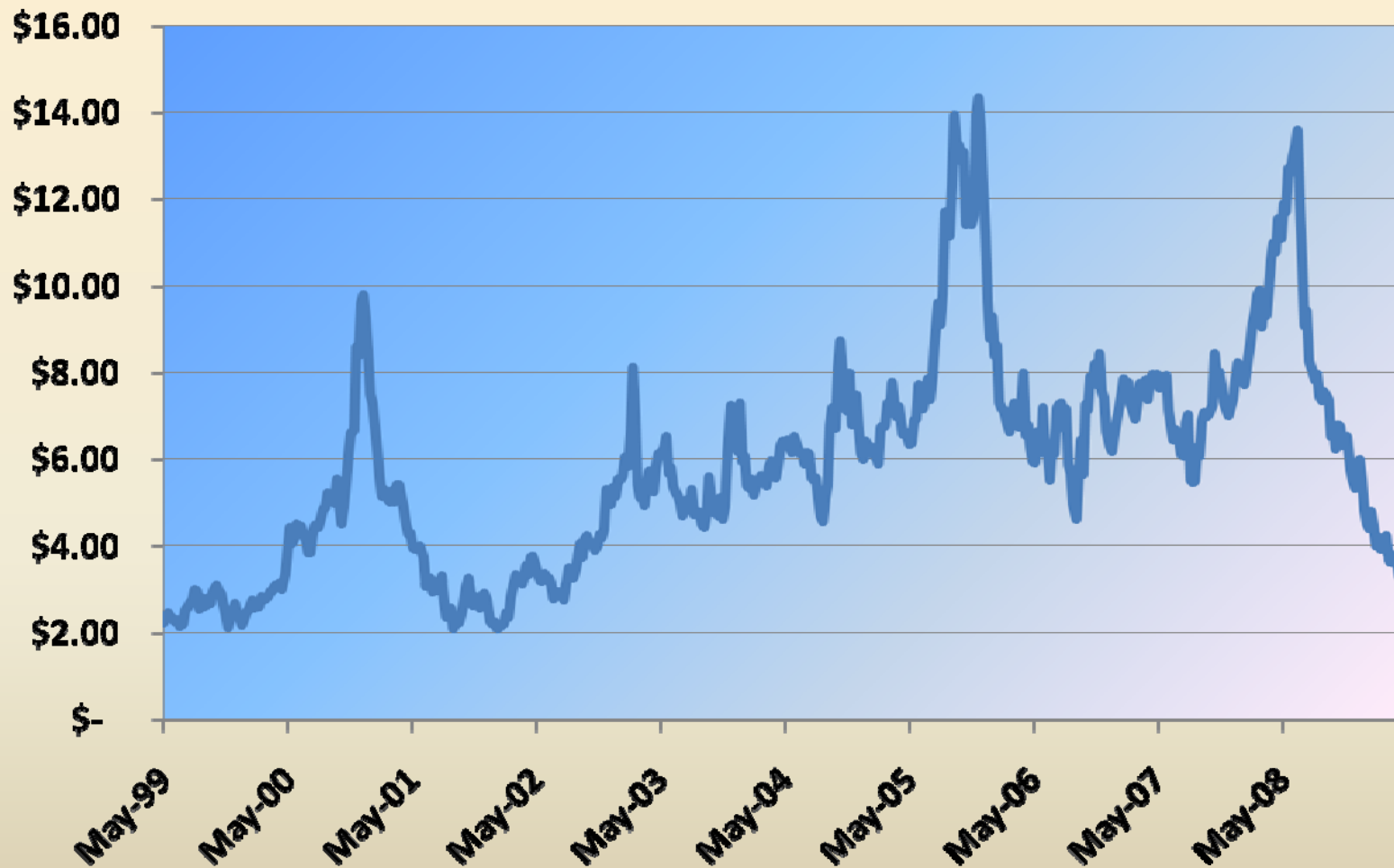
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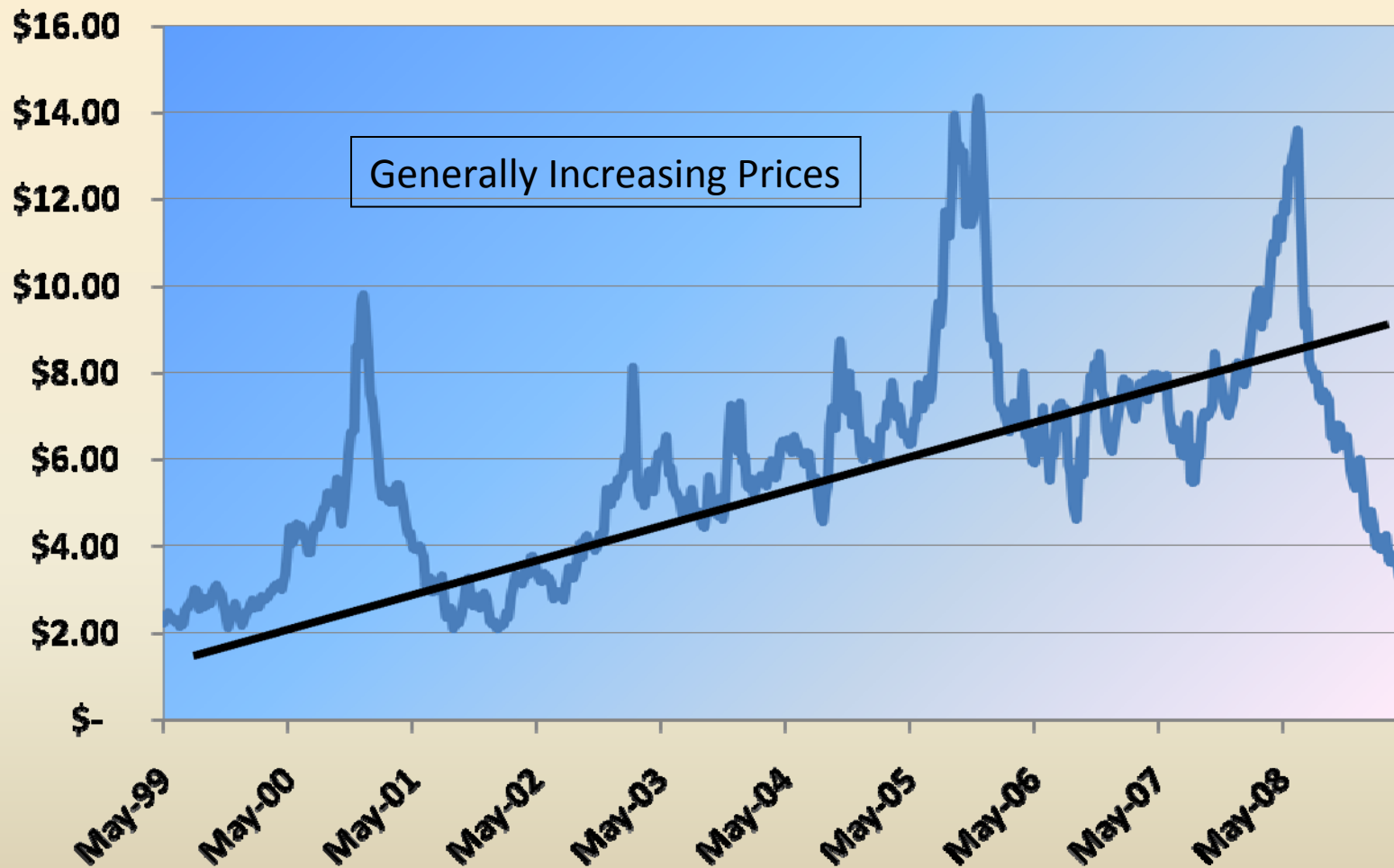
# Presentation Overview

- Description of U.S. Energy
- Historic Natural Gas Prices
- Forecasted Natural Gas Prices
- Factors Impacting Prices
- Conclusions

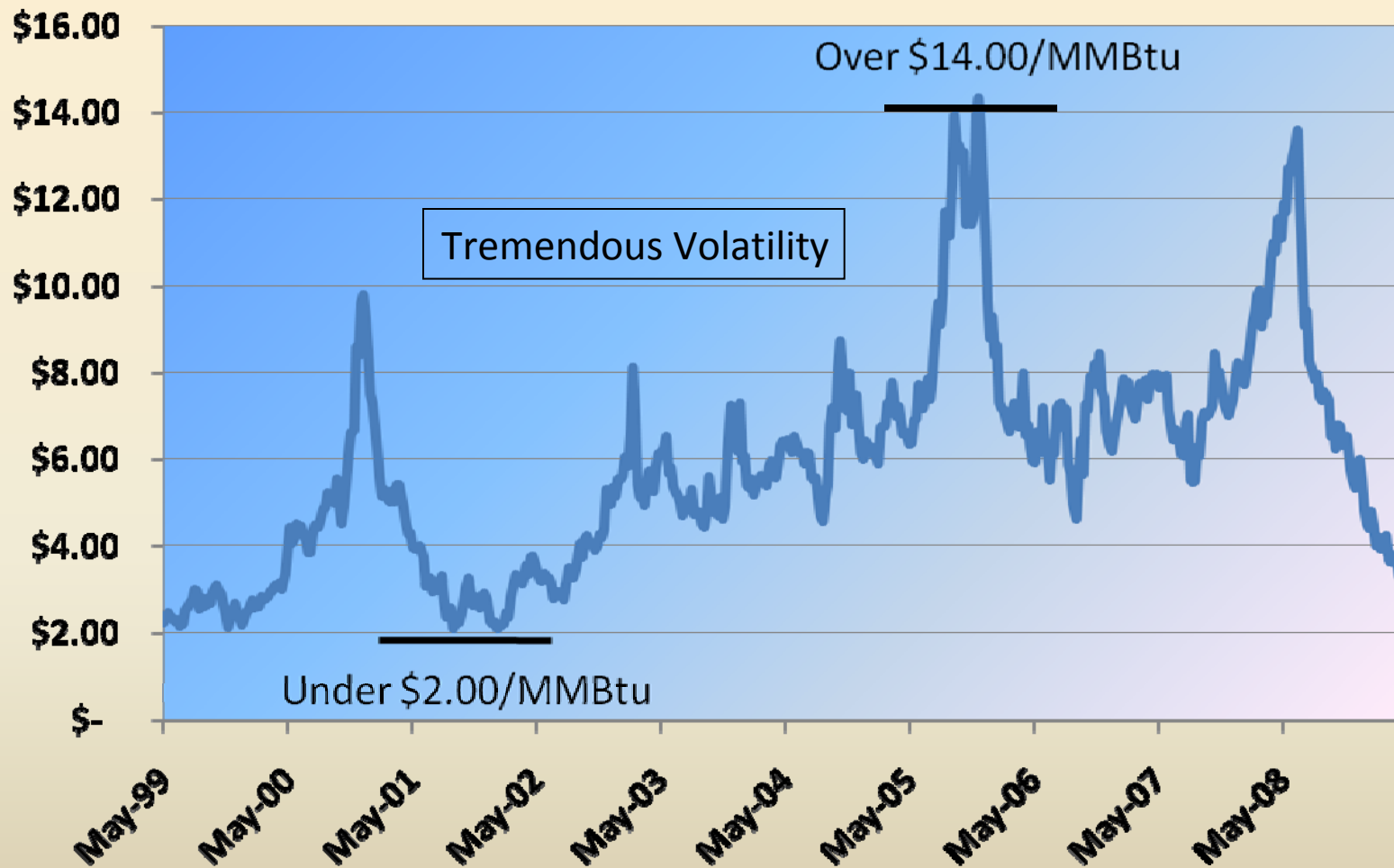
# Natural Gas Prices



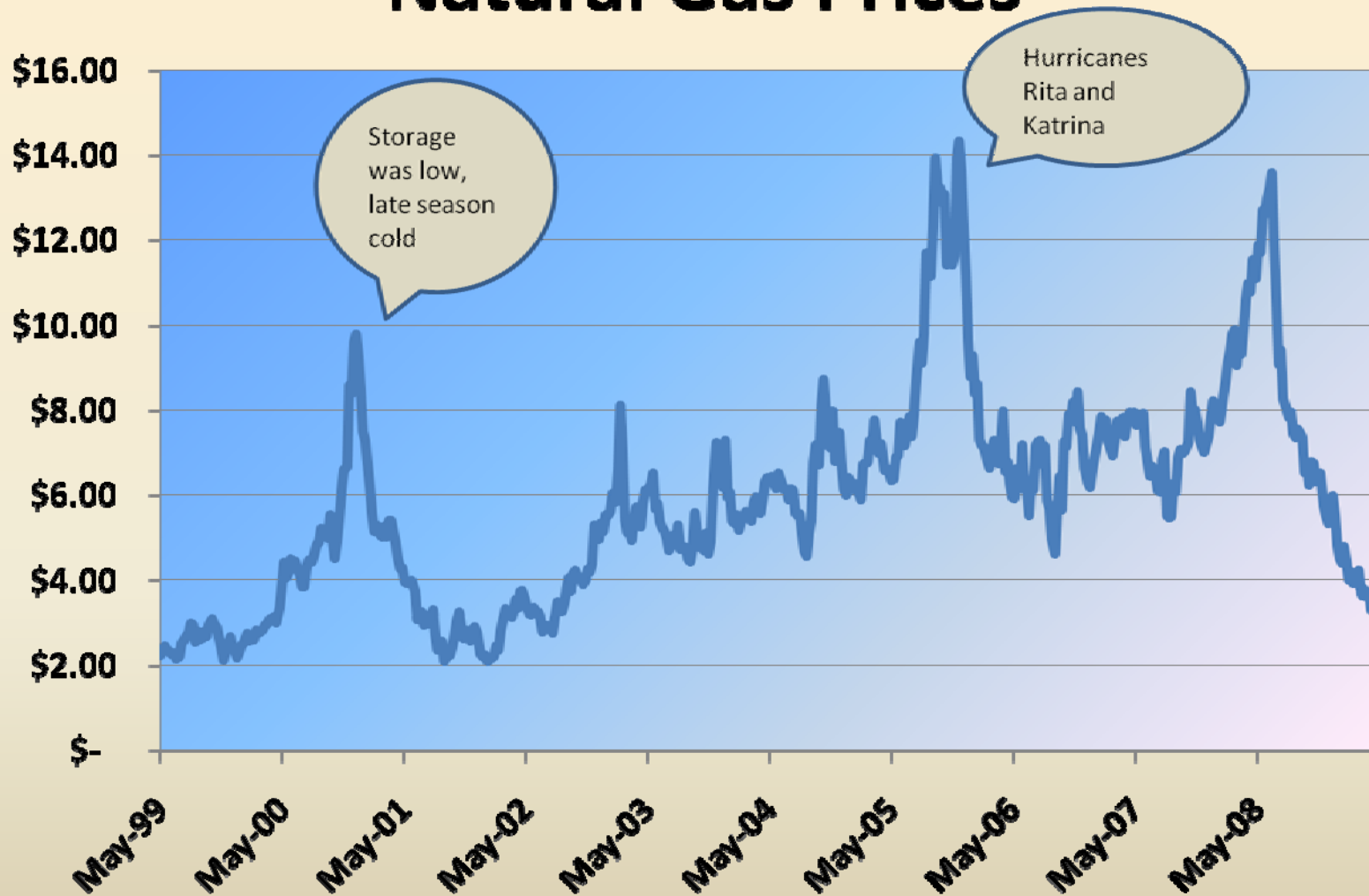
# Natural Gas Prices



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## Forward Natural Gas Prices

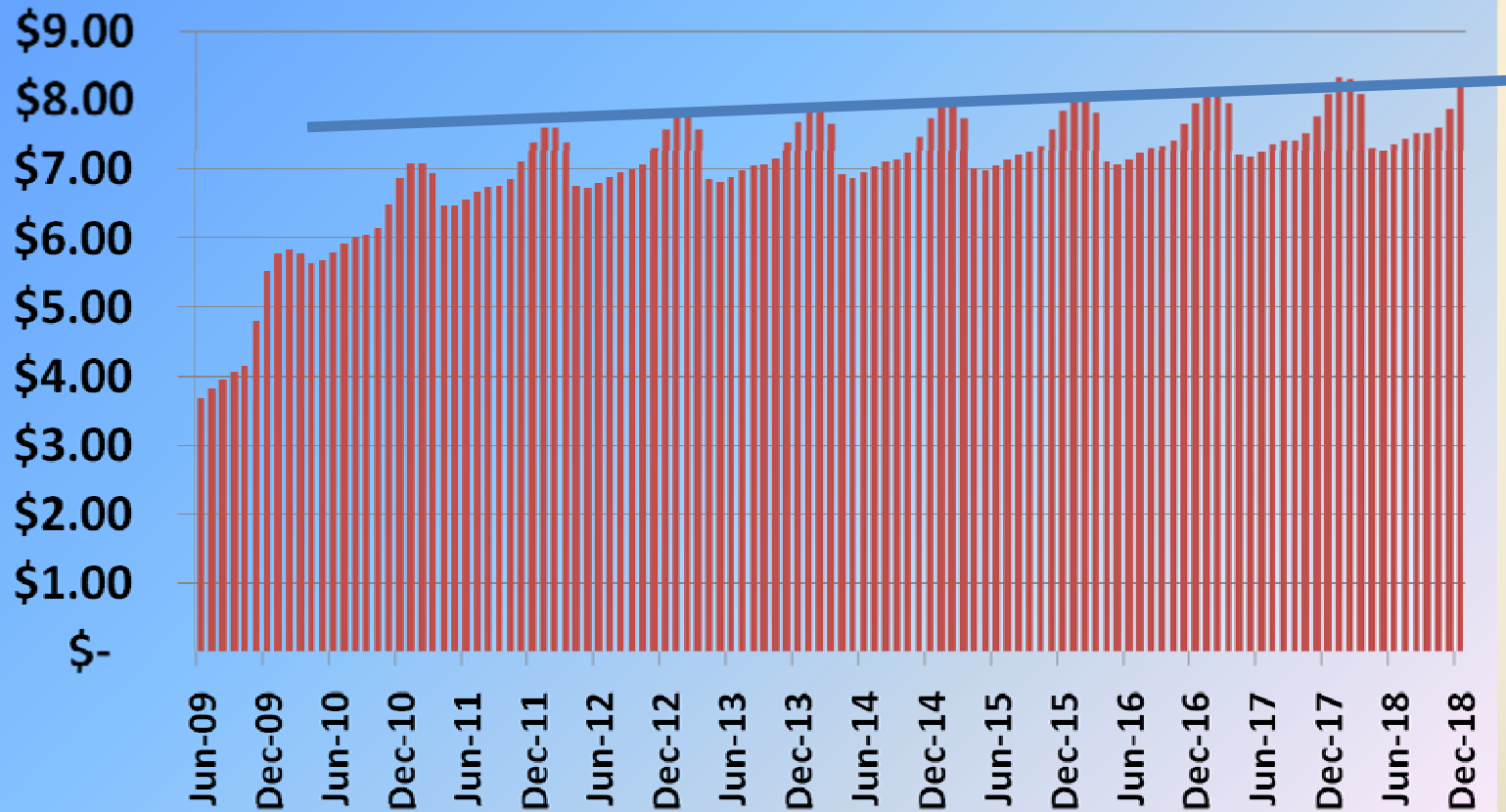




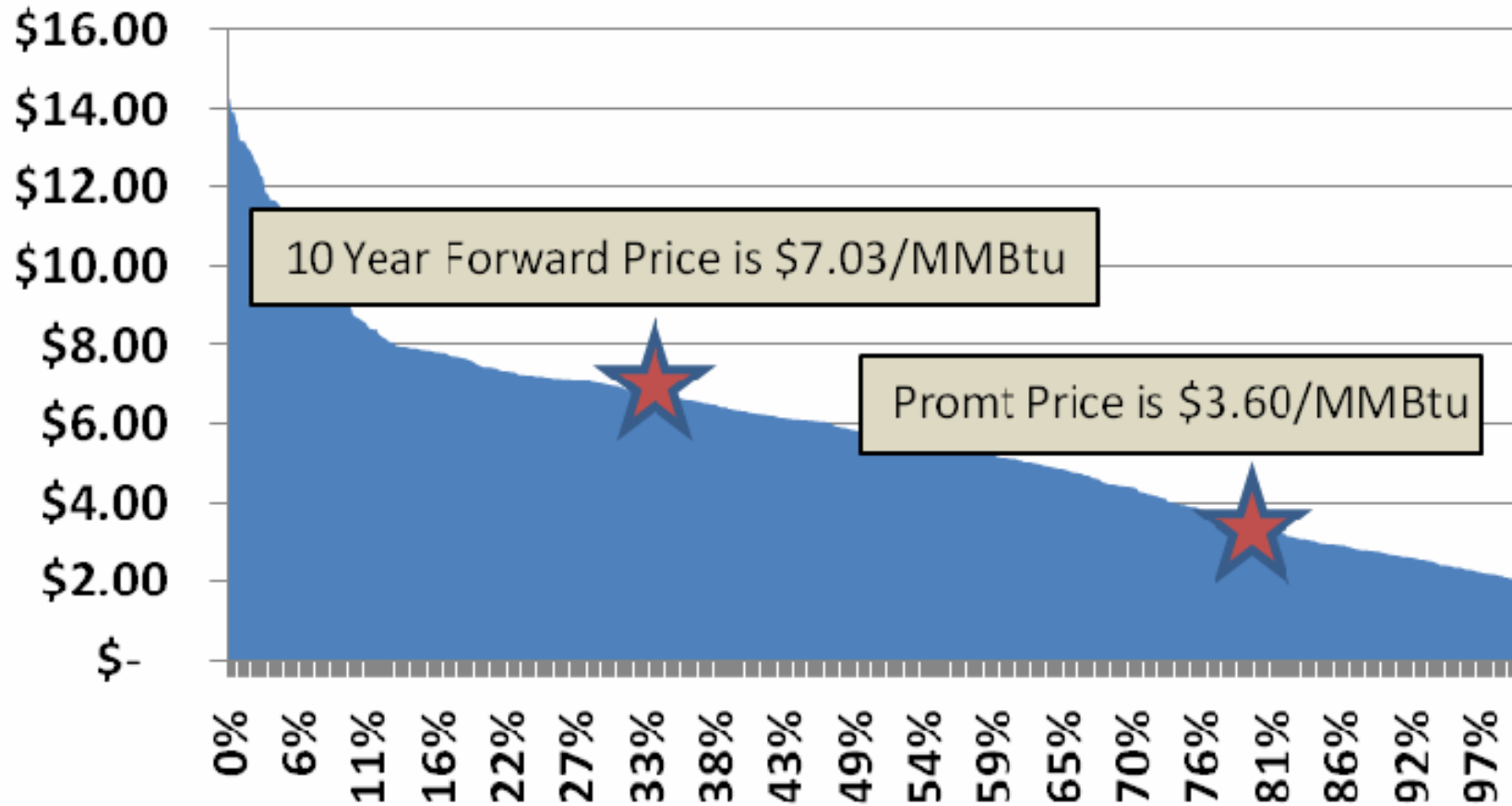
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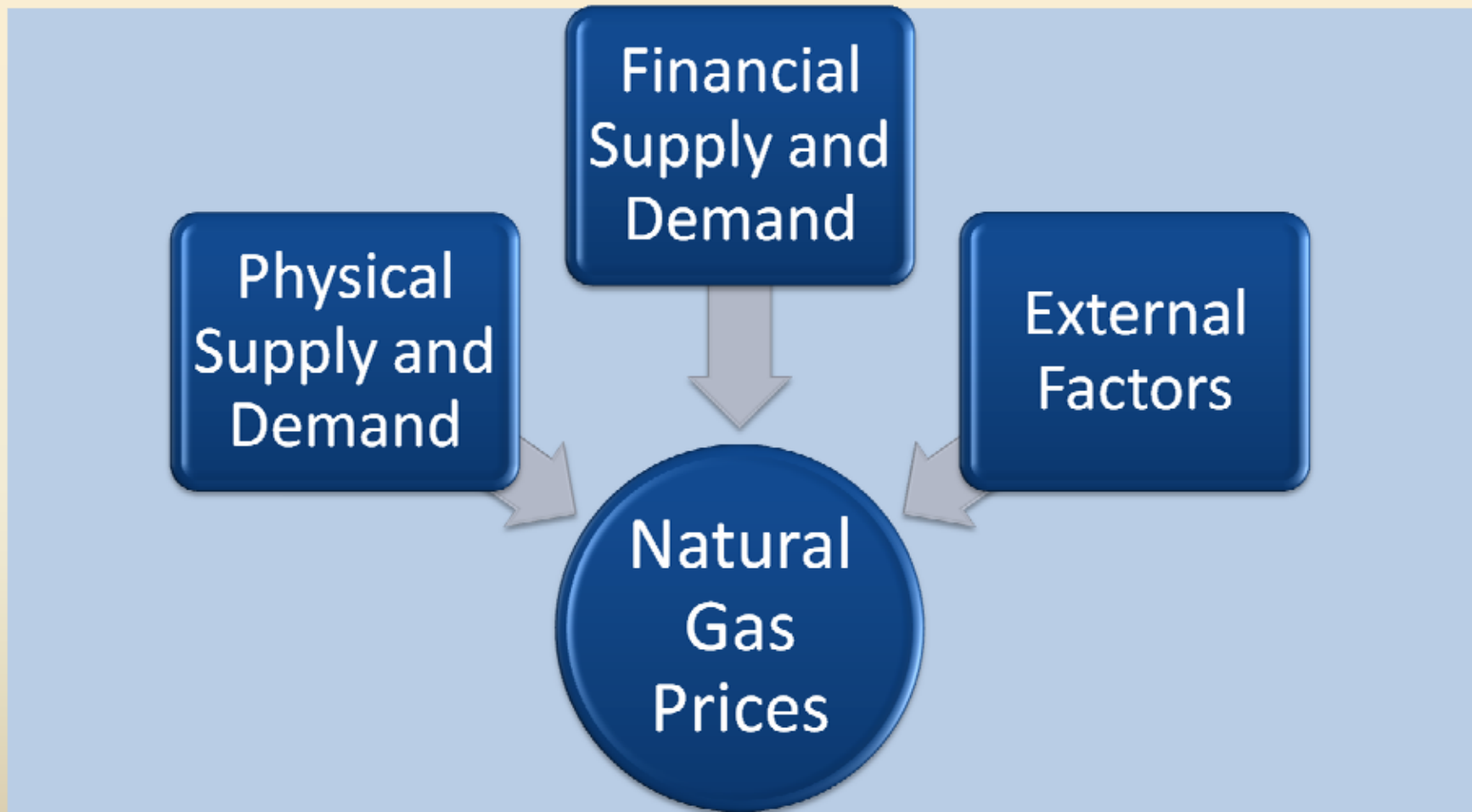
## Forward Natural Gas Prices



# Price Duration Curve



# The Pricing Paradigm



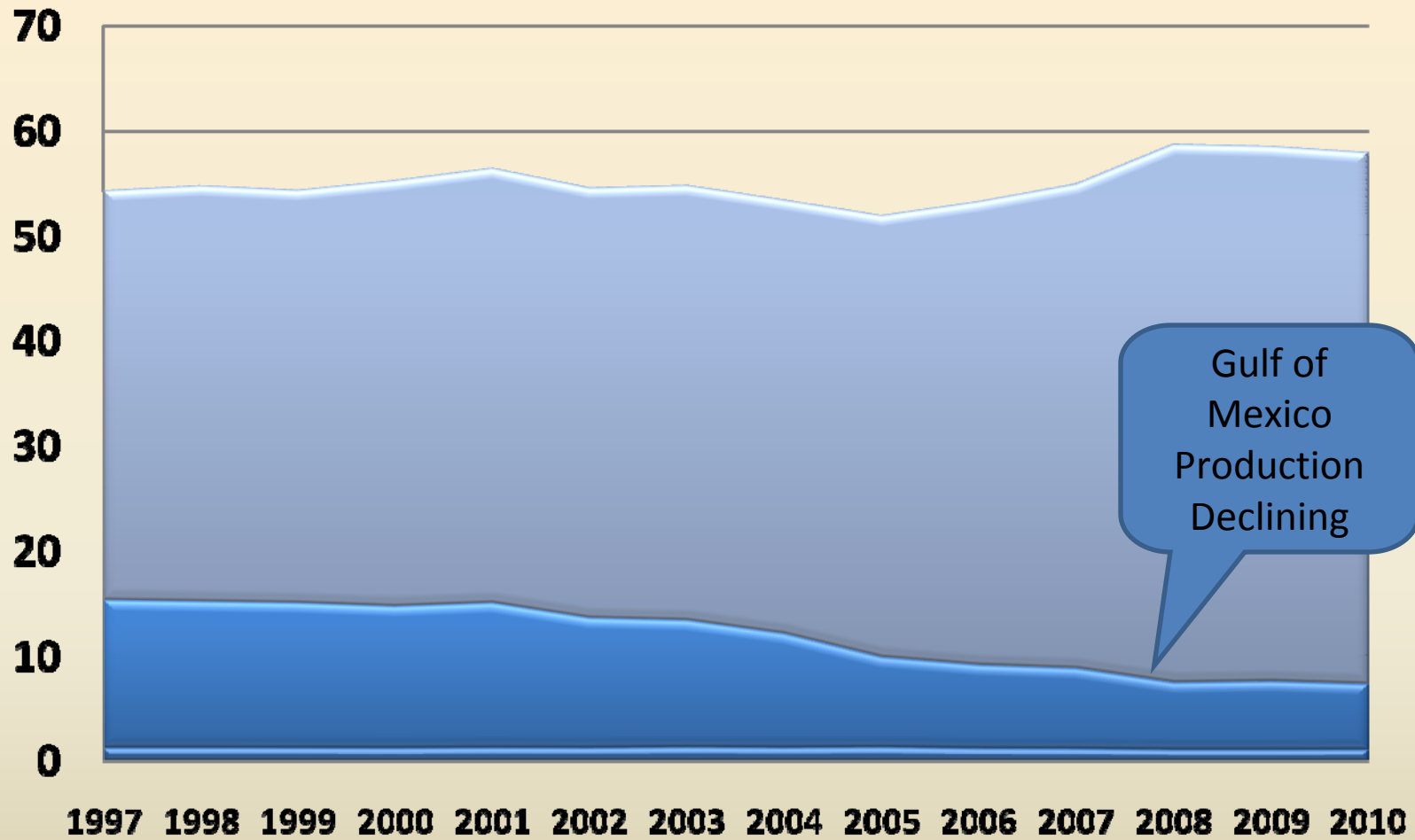
# Physical Supply and Demand



- **Production Levels**
- **Drilling Activity**
- **LNG Imports**

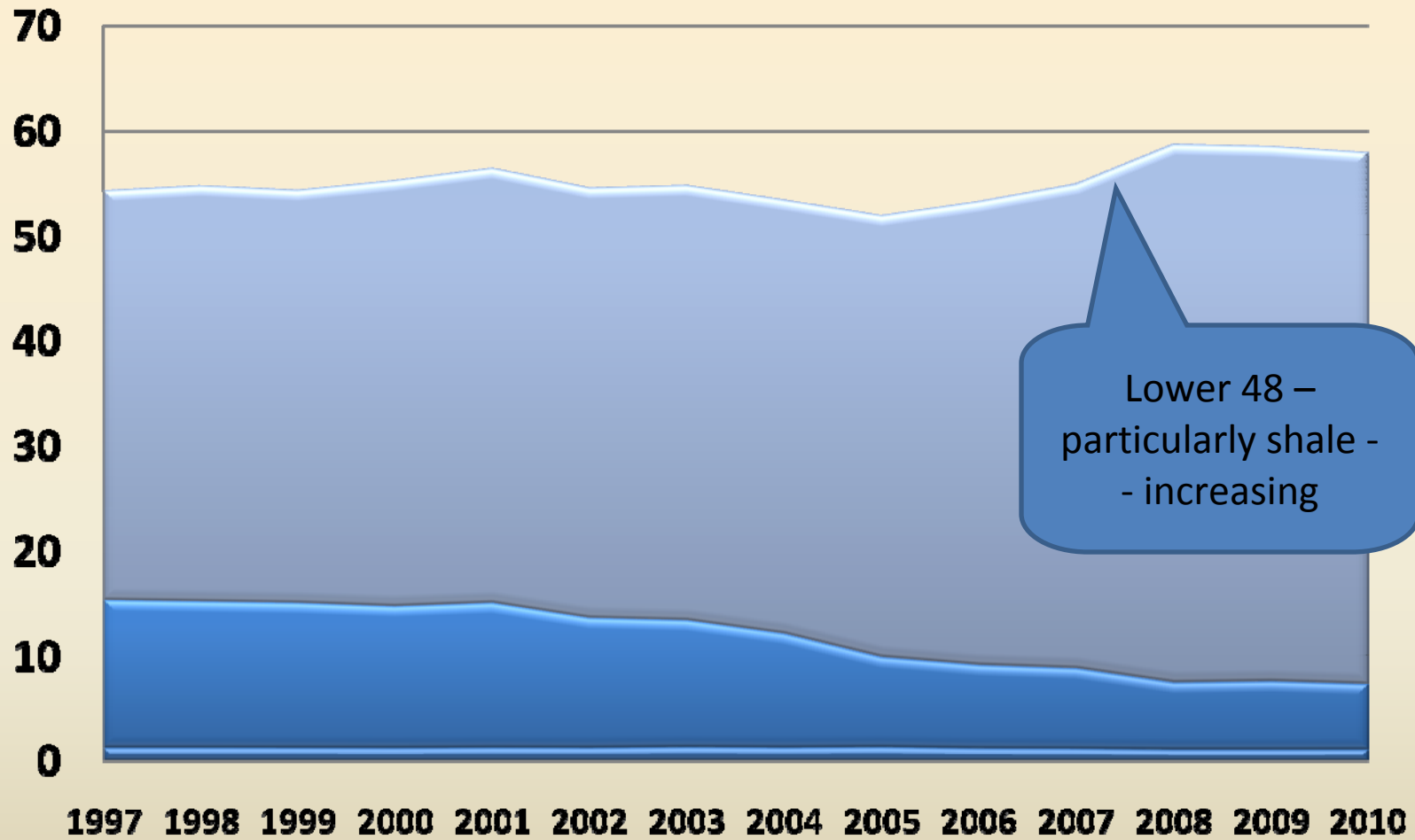
- **Structural Demand**
- **Weather Related Demand**
- **Electric Generation**

# Natural Gas Production (Bcf/day)



■ Alaska   ■ Gulf of Mexico   ■ Lower 48

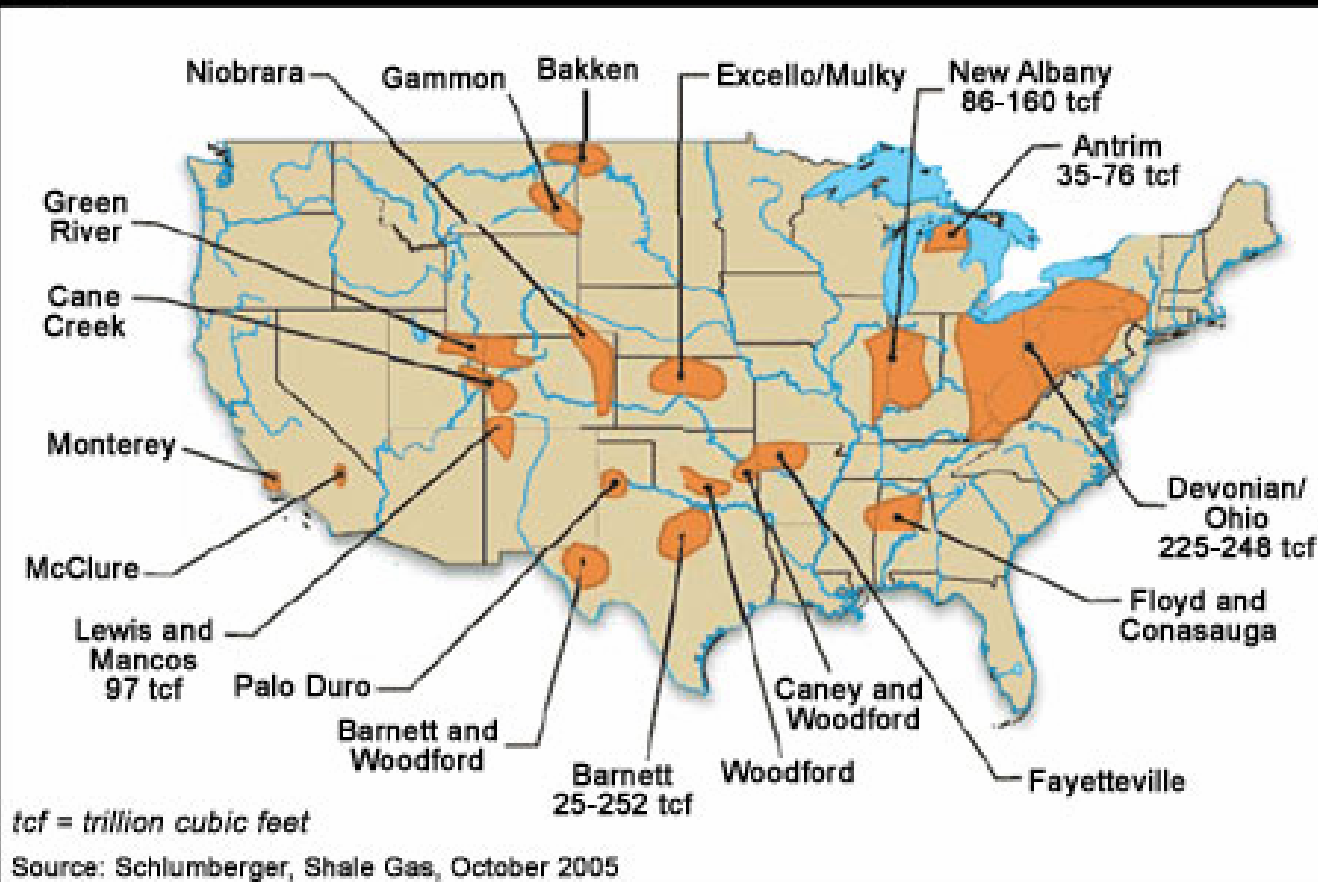
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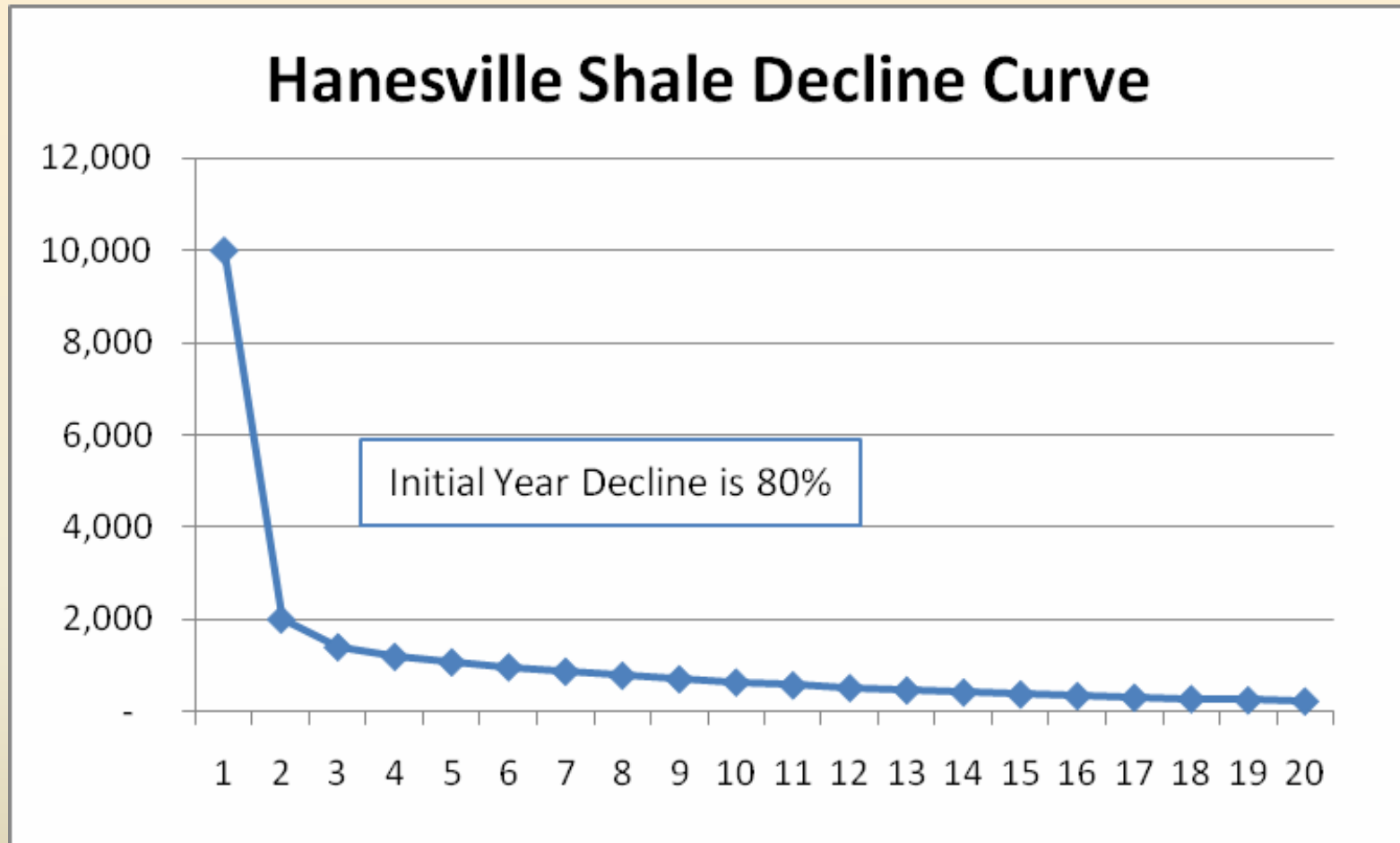
# Where is it coming from?

## Major U.S. shale basins

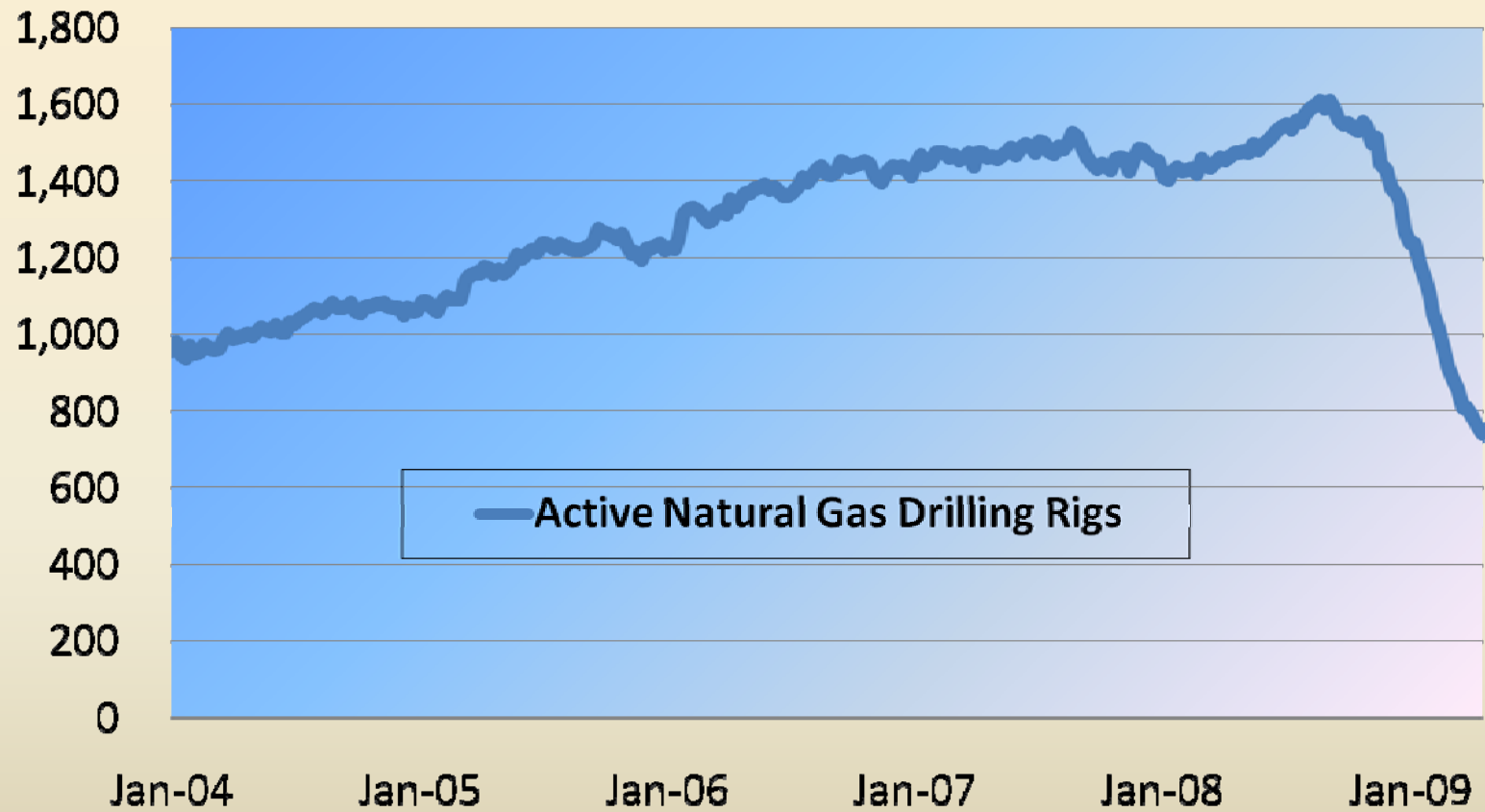




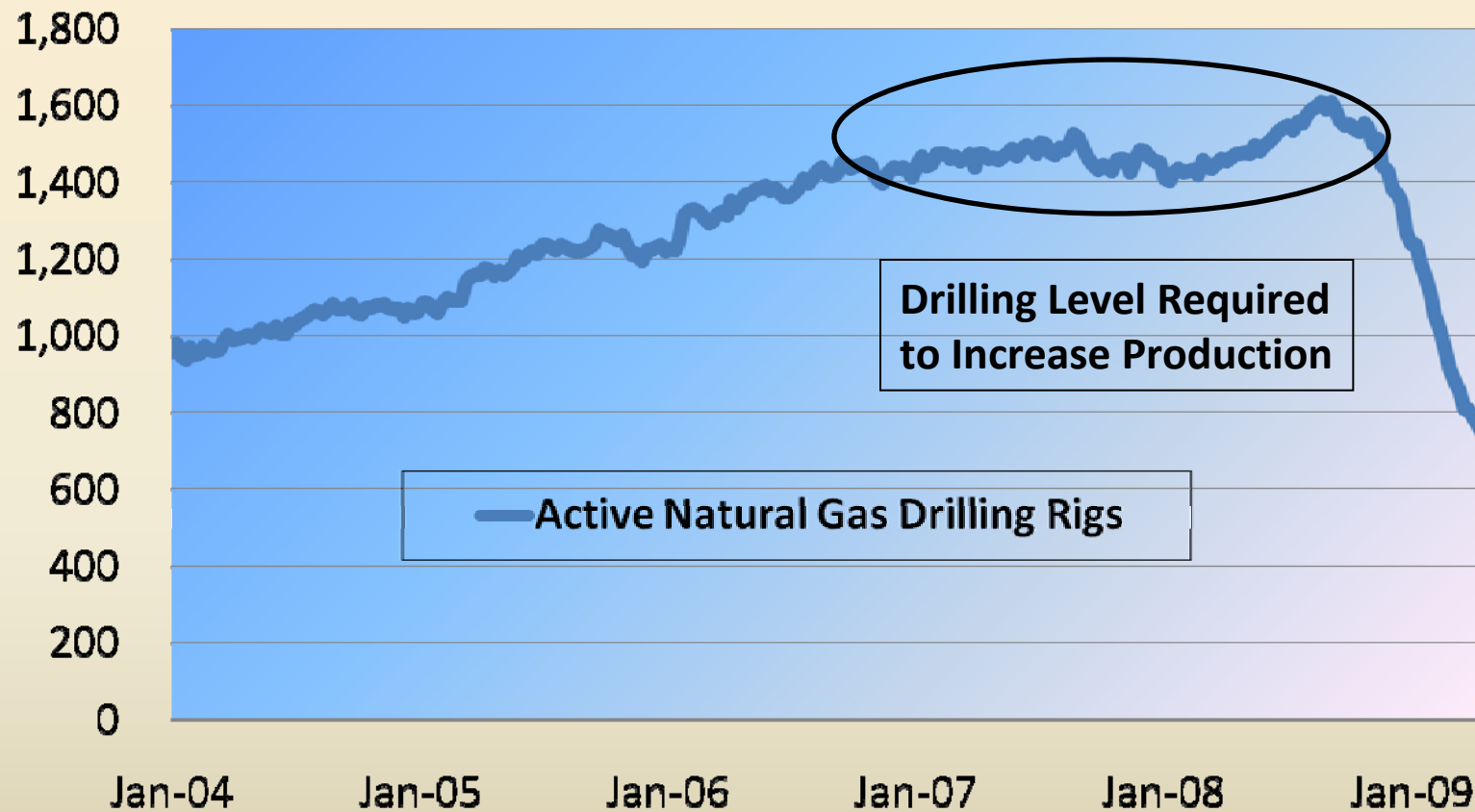
# Shale Decline Curve



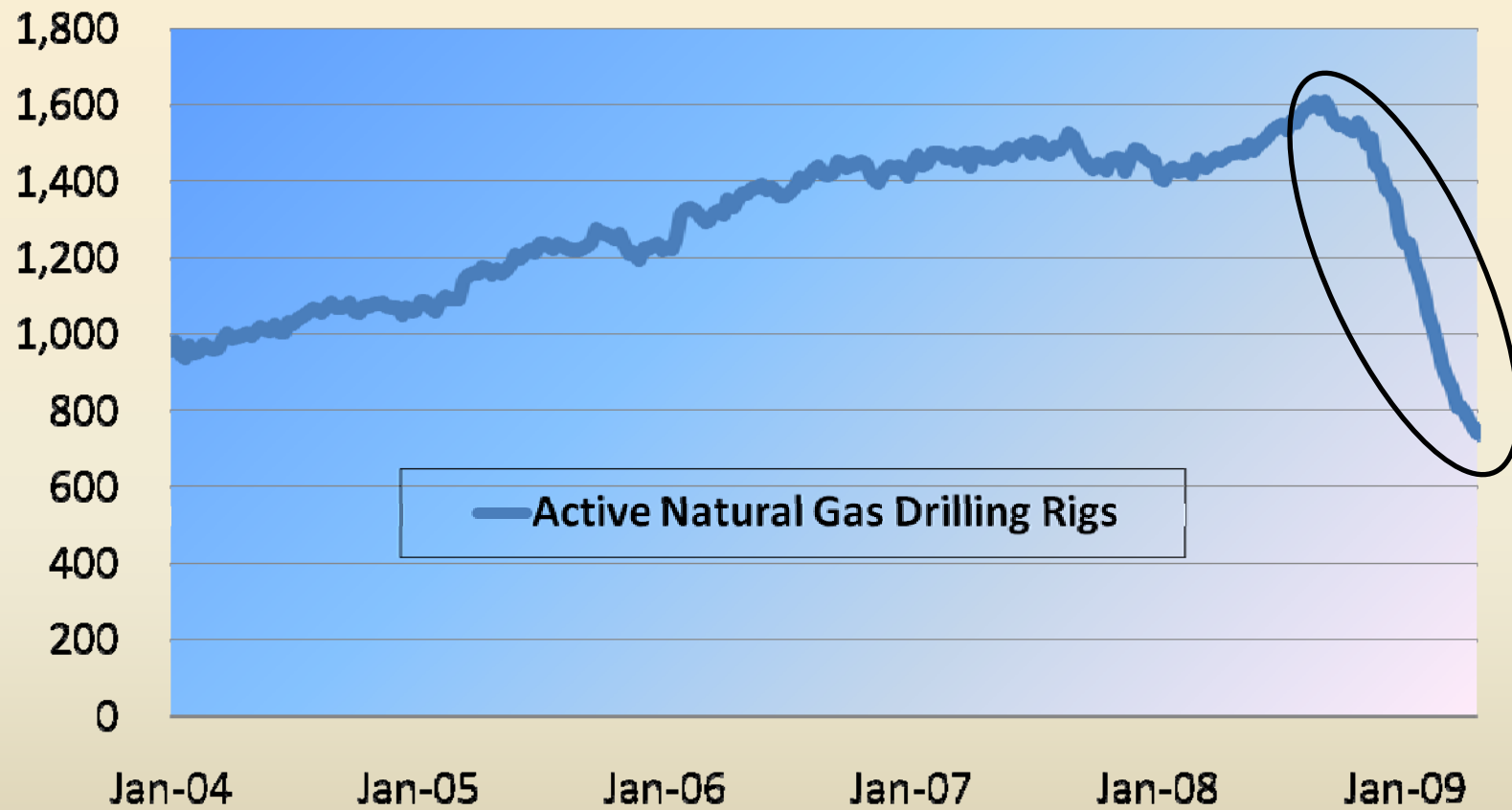
# Active Natural Gas Drilling Rigs



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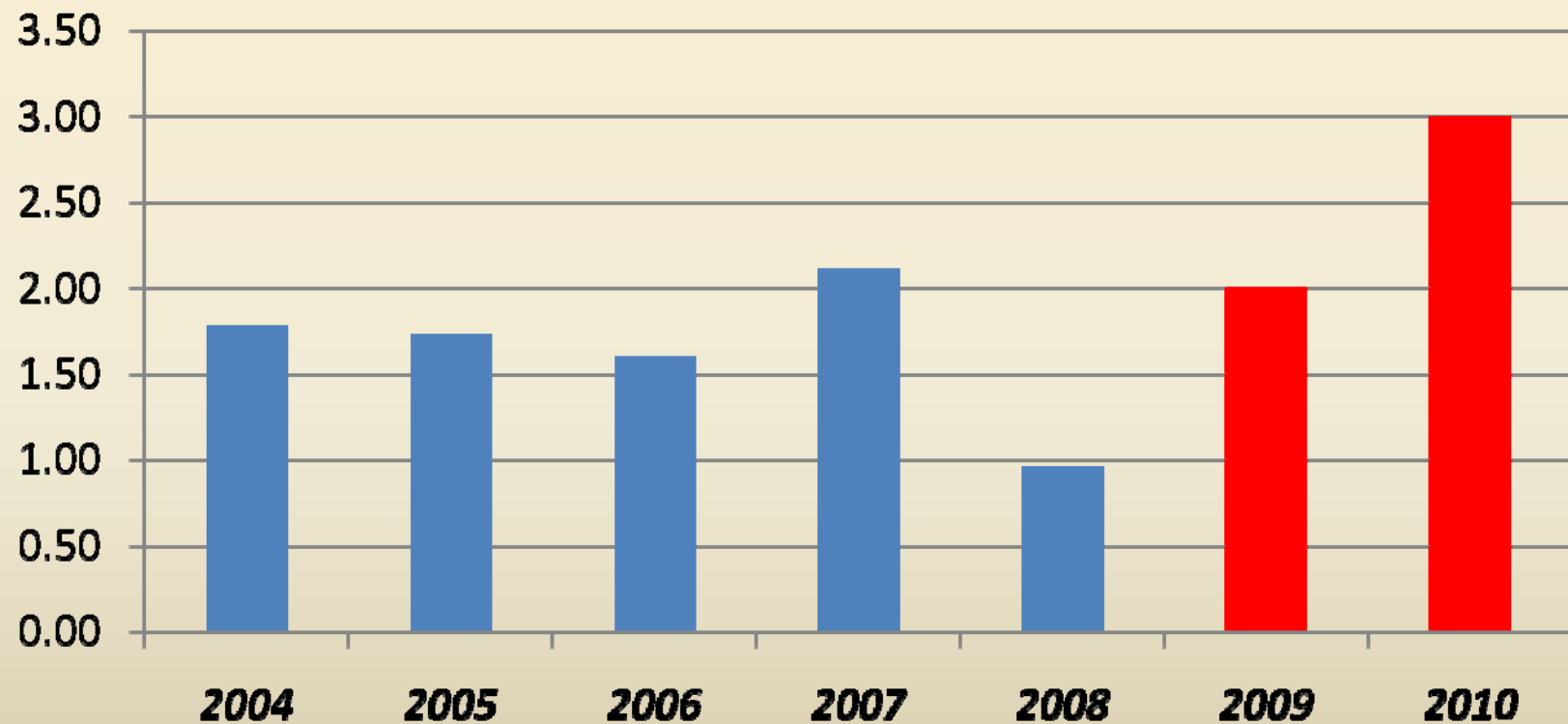


# Active Natural Gas Drilling Rigs



# The Wildcard: LNG

## LNG Imports (Bcf/Day)



# Natural Gas Fundamentals

## *Supply*

- Shale Production has been a pleasant surprise
- LNG Imports weak, but could strengthen
- Canadian Imports weak

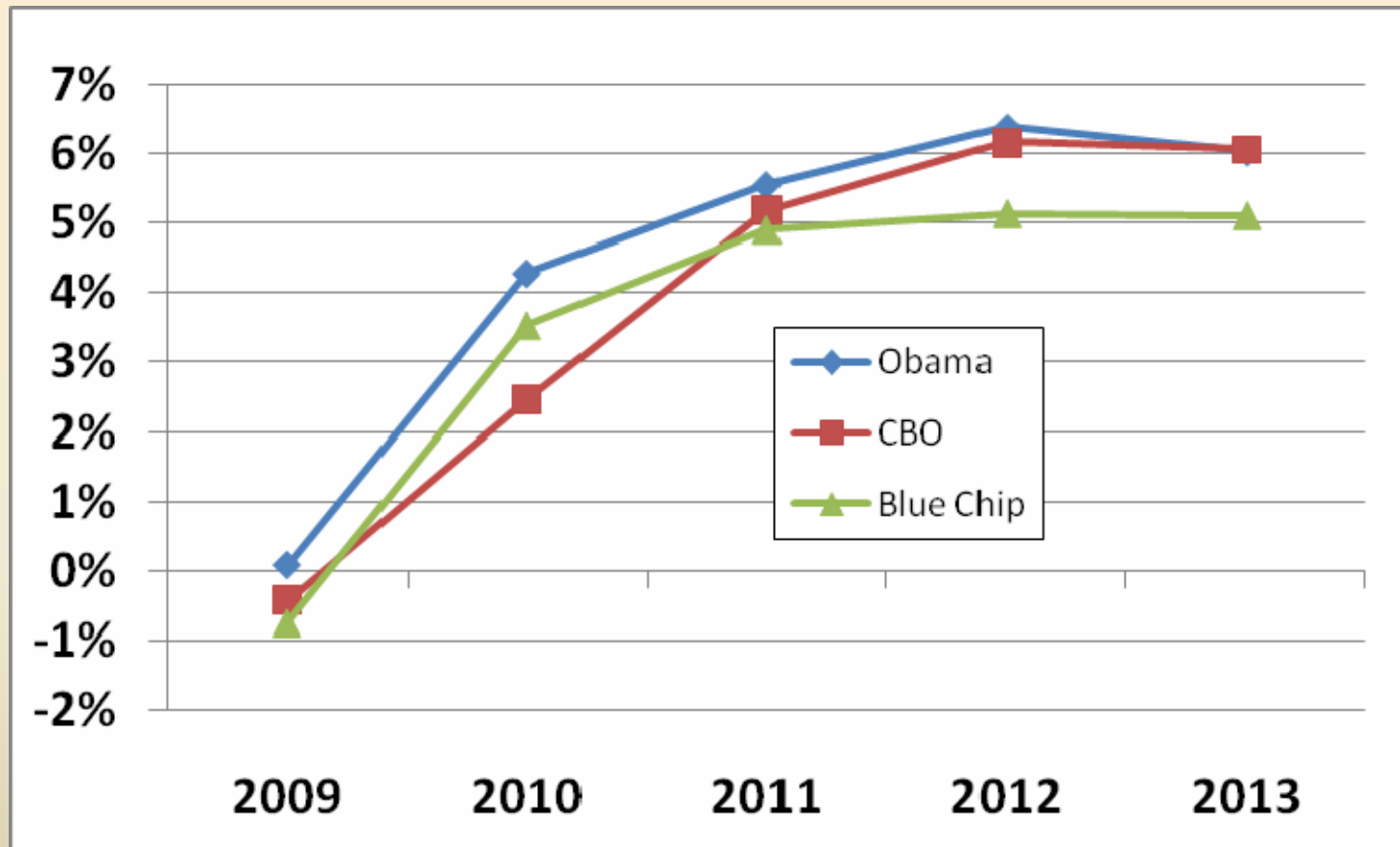
## *Demand*

- Natural gas is the fuel of choice
- Increased residential conversion rates in NE.
- Increased demand from Electric Generation sector

# Demand Trends

<b>Consumption</b> <i>(Billion cubic feet per day)</i>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
<b>Residential</b>	<b>13.3</b>	<b>13.22</b>	<b>11.97</b>	<b>12.92</b>	<b>13.33</b>
<b>Commercial</b>	<b>8.55</b>	<b>8.22</b>	<b>7.76</b>	<b>8.27</b>	<b>8.54</b>
<b>Industrial</b>	<b>19.79</b>	<b>18.07</b>	<b>17.84</b>	<b>18.15</b>	<b>18.15</b>
<b>Electric Power<sup>c</sup></b>	<b>14.93</b>	<b>16.08</b>	<b>17.05</b>	<b>18.74</b>	<b>18.2</b>
<b>Lease and Plant Fuel</b>	<b>3</b>	<b>3.05</b>	<b>3.13</b>	<b>3.28</b>	<b>3.51</b>
<b>Pipeline and Distribution Use</b>	<b>1.55</b>	<b>1.6</b>	<b>1.6</b>	<b>1.71</b>	<b>1.72</b>
<b>Vehicle Use</b>	<b>0.06</b>	<b>0.06</b>	<b>0.07</b>	<b>0.07</b>	<b>0.08</b>
<b>Total Consumption</b>	<b>61.17</b>	<b>60.3</b>	<b>59.41</b>	<b>63.14</b>	<b>63.53</b>

# Economic Growth Assumptions





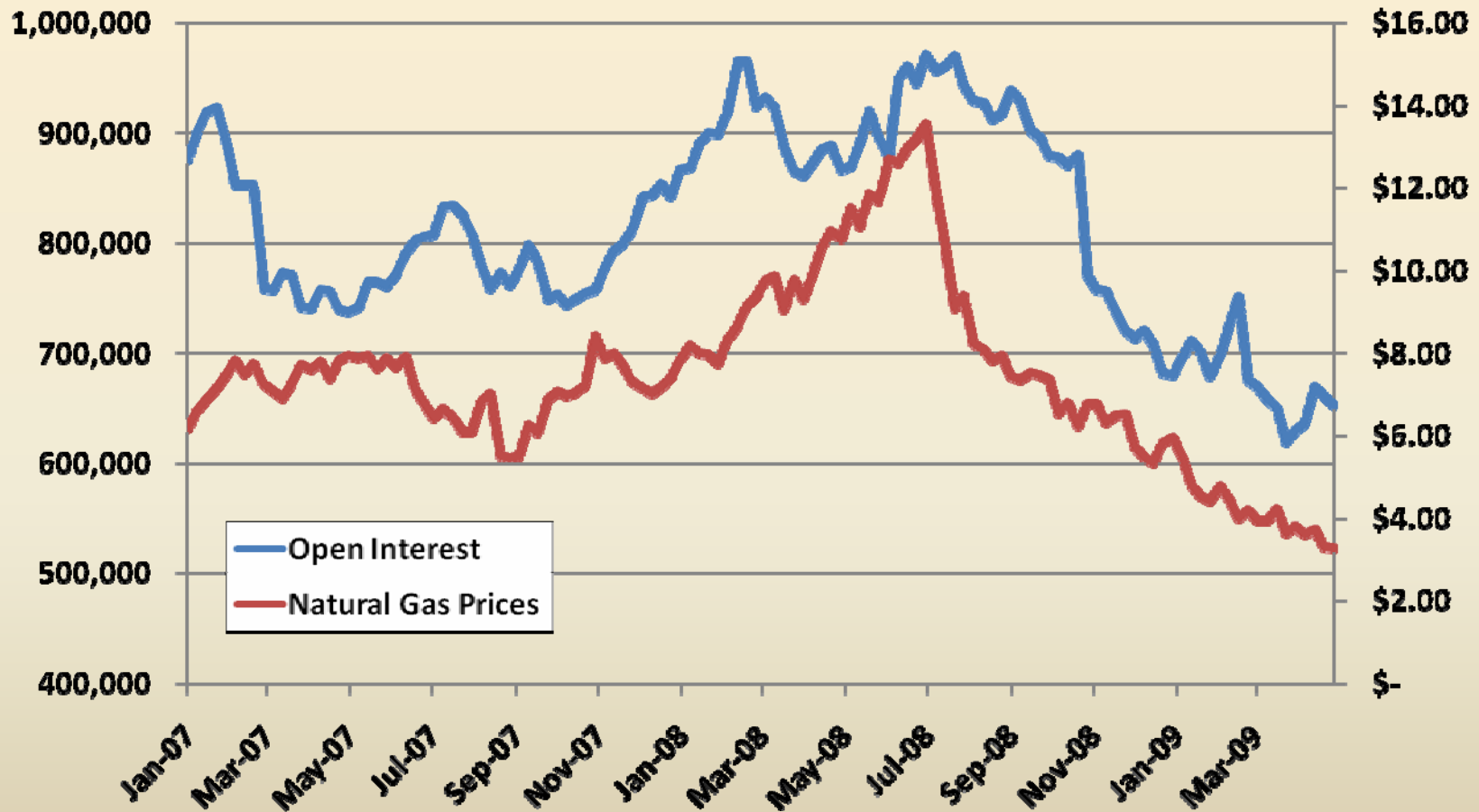
# Physical Supply/Demand Summary

- Domestic Supply will likely contract within 12-18 months
- Domestic Demand will be soft in 2009 and likely 2010
- LNG may supplement domestic supply if worldwide economy remains weak and European and Asian prices remain soft
- If (hopefully when) U.S. and World economy rebounds, natural gas prices are likely to spike based on supply/demand fundamentals

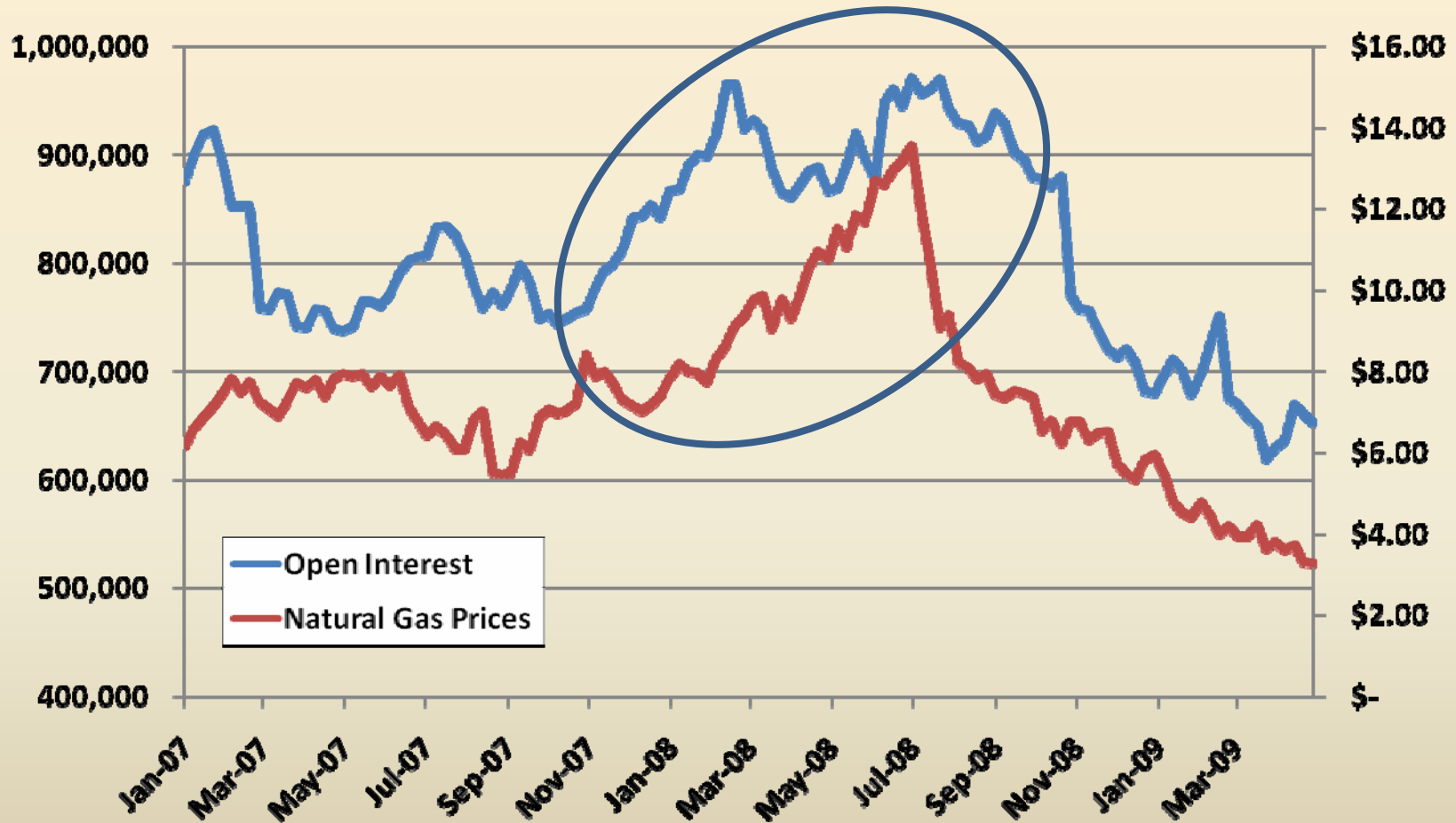
# Financial Supply/Demand



# Financial Supply/Demand



# Financial Supply/Demand



# Competing Factors

## ***BULLS:***

- Oil prices, which tend to influence natural gas prices, are much higher than historic levels
- Energy sources are increasingly expensive to access and operate
- Natural gas is increasingly the fuel of choice for heating, electric generation and possibly transportation

## ***BEARS:***

- Shale plays have been very successful
- Economic activity is slow
- Speculative activity is decreasing
- More supply coming from the Rockies via new pipelines

# Other/External Factors

- ***Alternative Fuel Prices***
  - *High oil prices support natural gas demand*
- Carbon Legislation (Cap and Trade)
  - Higher natural gas prices
  - Lower relative cost to other fossil fuels
- Renewable Portfolio Standards
  - More reliance on wind requires more “low capital” backup generation
- Economic Activity
  - ??????

# Oil Prices



# Oil Prices





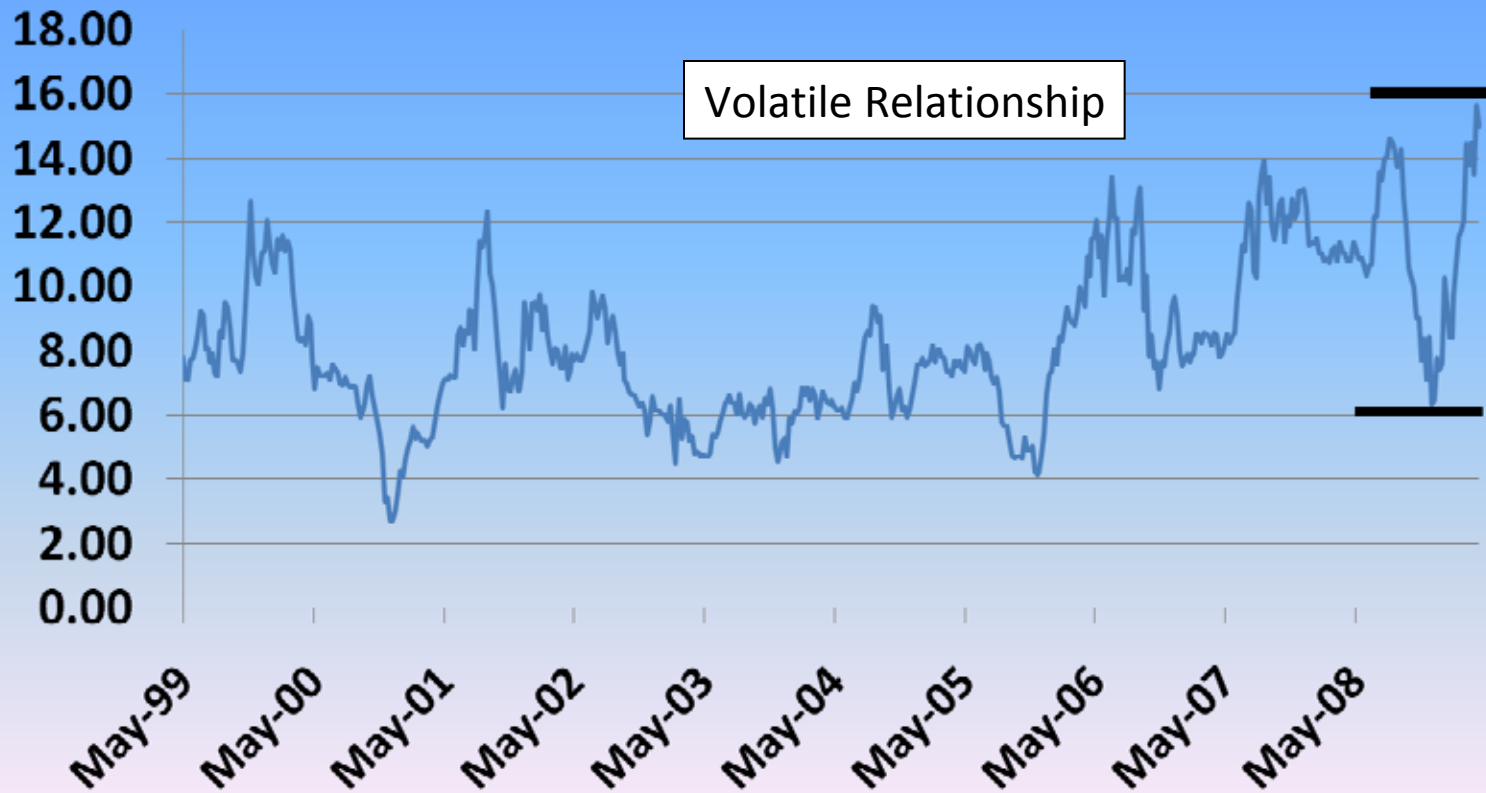
# Oil Prices



# Oil/Natural Gas Relationship



# Oil/Natural Gas Relationship

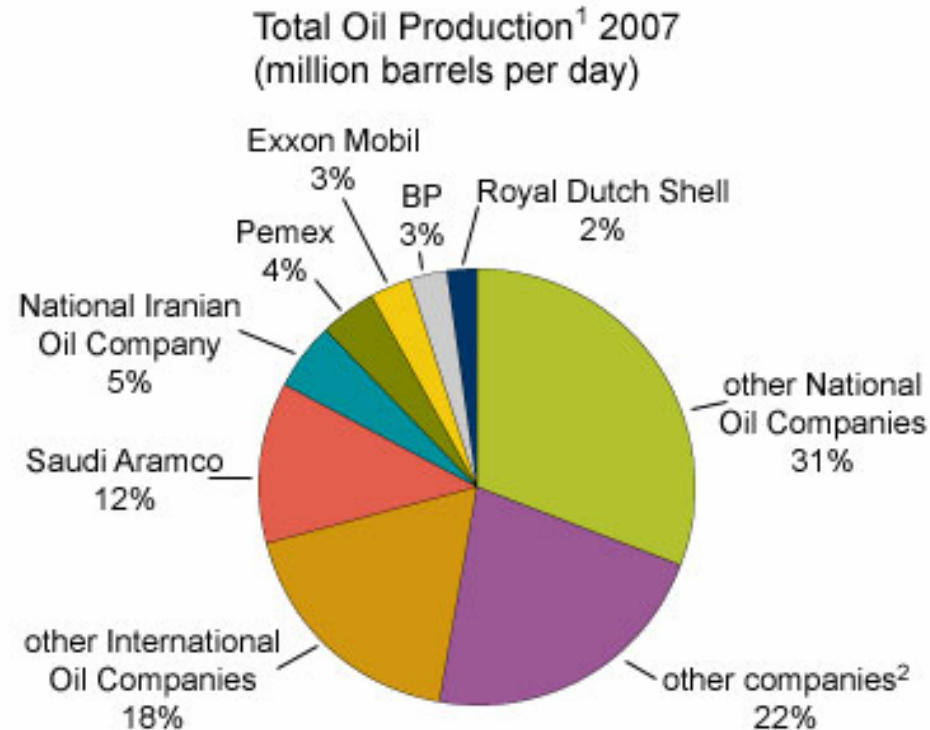


# Oil/Natural Gas Relationship



# Ownership of Oil Production

*In 2007, roughly 78% of total world oil was produced by 50 companies, and of that production, about 70% was produced by national oil companies.*



Source: Petroleum Intelligence Weekly, (Vol XLVII, No. 48). December 1, 2008.

<sup>1</sup> Total oil production includes crude oil, natural gas liquids, and condensates.

<sup>2</sup> Includes smaller companies outside of the top 50 producers.

# Oil/Natural Gas Relationship Observations

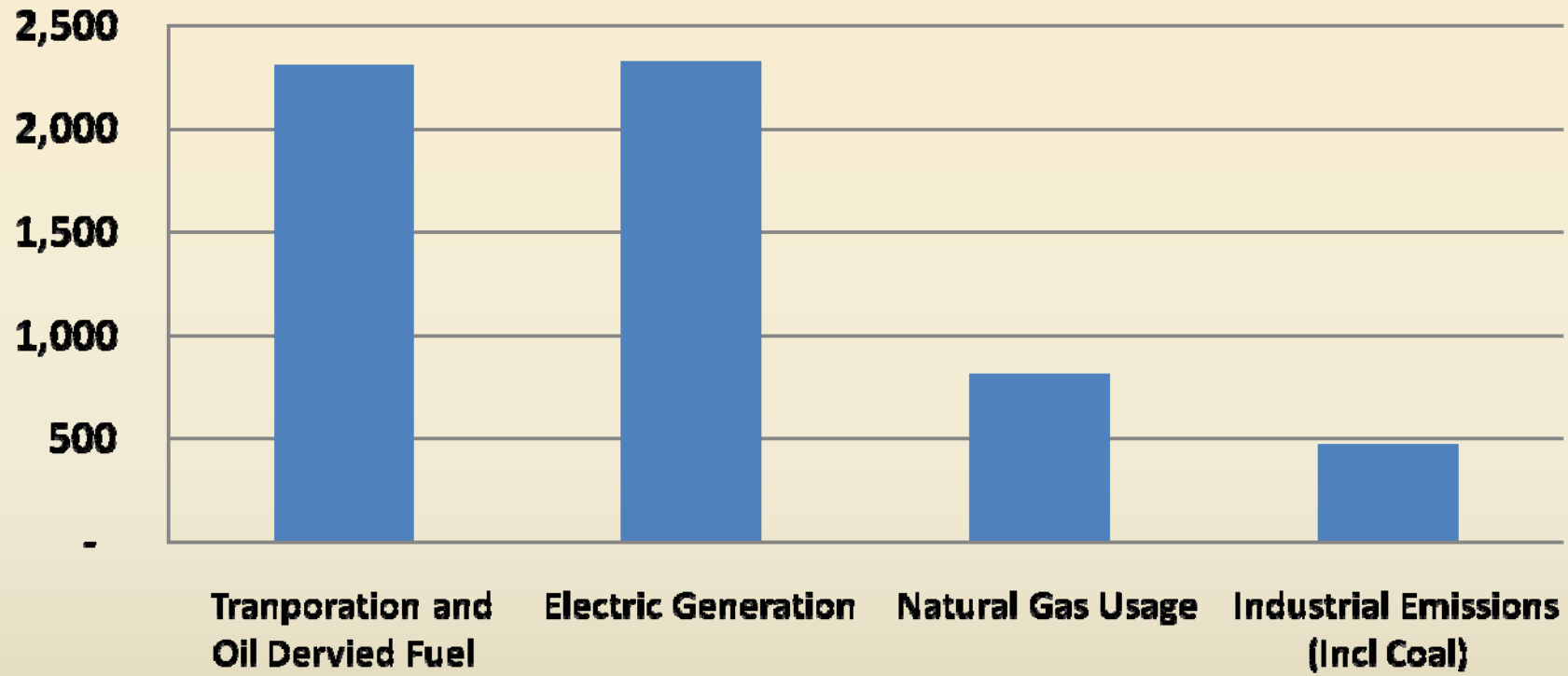
- There has been a weak relationship between oil and natural gas historically, we expect that to continue
- As each commodity trades based on its own fundamentals, the relationship will continue to be volatile
- At least for the next 12 months, natural gas is likely to be weak relative to oil

# Other/External Factors

- Alternative Fuel Prices
  - High oil prices support natural gas demand
- ***Carbon Legislation (Cap and Trade)***
  - *Higher natural gas prices*
  - *Lower relative cost to other fossil fuels*
- ***Renewable Portfolio Standards***
  - *More reliance on wind requires more “low capital” backup generation*
- Economic Activity
  - ??????

## CO2 Emissions by Type (2006) (000) metric tons

Source: EPA





# Carbon Allowance Cost Impacts

Energy Source	Equivalent Carbon Cost	Current Market Price	Potential Premium
Gasoline (per Gallon)	\$ 0.124	\$ 2.00	6%
Electricity (per kWh)	\$ 0.009	\$ 0.08	11%
Natural Gas (per MMBtu)	\$ 0.742	\$ 6.00	12%

Note: Based on \$14/ton Carbon Cost

Energy Source	Equivalent Carbon Cost	Current Market Price	Potential Premium
Gasoline (per Gallon)	\$ 0.443	\$ 2.00	22%
Electricity (per kWh)	\$ 0.030	\$ 0.08	38%
Natural Gas (per MMBtu)	\$ 2.650	\$ 6.00	44%

Note: Based on \$50/ton Carbon Cost

# Other/External Factors

- Alternative Fuel Prices
  - High oil prices support natural gas demand
- Carbon Legislation (Cap and Trade)
  - Higher natural gas prices
  - Lower relative cost to other fossil fuels
- Renewable Portfolio Standards
  - More reliance on wind requires more “low capital” backup generation
- ***Economic Activity***
  - ??????

# Conclusions

1. Prices will continue to be volatile
2. Prices will likely be soft at least through the summer
3. Prices will likely be higher one year from today than today (\$3.60 current price)
4. Could have significant spike in 12-18 months if economy (worldwide) recovers and drilling lags
5. Carbon Legislation will increase energy costs

**Thank You!**